United Nations

FCCC/TAR/2017/HND

Framework Convention on Climate Change

Distr.: General
23 January 2018

English only

Report of the technical assessment of the proposed forest reference emission level of Honduras submitted in 2017

Summary

This report covers the technical assessment of the submission of Honduras, on a voluntary basis, on its proposed forest reference emission level (FREL), in accordance with decision 13/CP.19 and in the context of results-based payments. The FREL proposed by Honduras covers the activity "reducing emissions from deforestation", which is among the activities included in decision 1/CP.16, paragraph 70. In its submission, Honduras has developed a national FREL. The FREL presented in the original submission for the reference period 2000–2016 corresponds to 7,756,056.50 tonnes of carbon dioxide equivalent per year (t CO_2 eq/year). As a result of the facilitative process during the technical assessment, Honduras submitted a modified estimate of the FREL of 6,552,746.47 t CO_2 eq/year. The assessment team notes that the data and information used by Honduras in constructing its FREL are transparent but partially complete and therefore not fully in accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FREL and a few areas identified by the assessment team for further technical improvement, according to the scope of the technical assessment in the annex to decision 13/CP.19.

GE.18-00872(E)

1800872

Contents

I. Introduction and summary

A. Overview

1. This report covers the technical assessment (TA) of the submission of Honduras on its proposed forest reference emission level (FREL),[1] submitted on 20 January 2017 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place (as a centralized activity) from 13 to 17 March 2017 in Bonn, Germany, and was coordinated by the UNFCCC secretariat.[2] The TA was conducted by two land use, land-use change and forestry (LULUCF) experts from the UNFCCC roster of experts[3] (hereinafter referred to as the assessment team (AT)): Mr. Javier Cano Martín (Chile) and Mr. Raúl Abad Viñas (European Union). In addition, Mr. Khanyisa Brian Mantlana, an expert from the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention, participated as an observer[4] during the centralized activity in Bonn.

2. In response to the invitation by the Conference of the Parties (COP) and in accordance with the provisions of decision 12/CP.17, paragraphs 7–15, and its annex, Honduras submitted, on a voluntary basis, its proposed FREL. The proposed FREL is one of the elements[5] to be developed in the implementation of the activities referred to in decision 1/CP.16, paragraph 70. The COP decided that each submission of a proposed FREL and/or forest reference level (FRL), as referred to in decision 12/CP.17, paragraph 13, shall be subject to a TA in the context of results-based payments, pursuant to decision 13/CP.19, paragraphs 1 and 2, and decision 14/CP.19, paragraphs 7 and 8.

3. Honduras provided its submission in Spanish. The submission was supported by 12 annexes, also in Spanish, which provided additional information[6] that enhanced the transparency of the submission.

4. The objective of the TA was to assess the degree to which information provided by Honduras was in accordance with the guidelines for submissions of information on FRELs/FRLs[7] and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FREL, with a view to supporting the capacity of Honduras for the construction and future improvement of its FRELs/FRLs, as appropriate.[8]

5. The TA of the FREL submitted by Honduras was undertaken in accordance with the guidelines and procedures for the TA of submissions from Parties on proposed FRELs and/or FRLs as contained in the annex to decision 13/CP.19. This report on the TA was prepared by the AT following the guidelines and procedures in the same decision.

[1] The submission of Honduras is available at http://redd.unfccc.int/submissions.html?country=hnd.
[2] Decision 13/CP.19, annex, paragraph 7.
[3] Decision 13/CP.19, annex, paragraphs 7 and 9.
[4] Decision 13/CP.19, annex, paragraph 9.
[5] Decision 1/CP.16, paragraph 71(b).
[6] Forest definition (annex 1); the protocol to classify digital RapidEye images used in the forest cover and land-use map (annex 2); a methodological description of the forest cover and land-use map for 2012 (annex 3); the protocol to generate the forest cover losses using Google Earth Engine scripts (annex 4); a methodological description of the Landsat sensor map of the forest cover changes due to deforestation (annex 5); a description of the use of the software Monteverdi for satellite image segmentation (annex 6); the protocol for validation and checking of the thematic accuracy of the map of changes due to deforestation in the periods 2000–2006, 2006–2012 and 2012–2016 (annex 7); a description of data acquisition at control plots and systematization of information (annex 8); the field manual for the establishment of sample units and their plots in 2014–2015 (annex 9); the field manual for data collection for the first national forest assessment 2005–2006 (annex 10); the calculation procedures for the national forest inventory database (annex 11); and the quality control procedures used in the second national forest assessment 2011–2015 (annex 12).
[7] Decision 12/CP.17, annex.
[8] Decision 13/CP.19, annex, paragraph 1(a) and (b).

6. Following the process set out in the guidelines and procedures in the annex to decision 13/CP.19, a draft version of this report was communicated to the Government of Honduras. The technical exchange during the TA allowed Honduras to provide clarifications and information that were considered by the AT in the preparation of this report.[9] As a result of the facilitative interactions with the AT during the TA, Honduras submitted a modified version of its FREL on 21 May 2017, which took into consideration most of the technical inputs of the AT. The modifications improved the clarity and transparency of the submitted FREL. This TA report was prepared in the context of the modified FREL submission. The modified submission, which contains the assessed FREL, and the original submission are available on the UNFCCC website.[10]

B. Proposed forest reference emission level

7. The national FREL proposed by Honduras for the historical reference period 2000–2016 is the annual average of the carbon dioxide (CO_2) emissions associated with deforestation, defined as the conversion of forest land, including shade-grown coffee and cacao plantations, to non-forest land. The FREL includes only the gross emissions from deforestation that are associated with the loss of forest coverage and excludes any subsequent emissions and removals from deforested areas. The information on activity data used for constructing the FREL was derived from a map that represents forest cover changes for the periods 2000–2006, 2006–2012 and 2012–2016. Therefore, the reference period is 2000–2016. The information on emission factors was obtained from two national forest assessments, carried out during the periods 2005–2006 and 2011–2015.[11] The FREL presented in the modified submission with the aim of accessing results-based payments for REDD-plus activities[12] from 2017 onward corresponds to 6,552,746.47 t CO_2 eq/year.[13]

8. In decision 1/CP.16, paragraph 70, the COP encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking a number of activities, as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances, in the context of the provision of adequate and predictable support. The FREL proposed by Honduras, on a voluntary basis, for a TA in the context of results-based payments, covers "reducing emissions from deforestation", which is one of the five activities included in decision 1/CP.16, paragraph 70. Pursuant to paragraph 71(b) of the same decision, Honduras has developed a national FREL for the entire national territory. In its submission, Honduras applies a stepwise approach to its development of the FREL, in accordance with decision 12/CP.17, paragraph 10. The stepwise approach enables Parties to improve the FREL by incorporating better data, improved methodologies and, where appropriate, additional pools.

9. The proposed FREL includes the pools above-ground biomass, below-ground biomass, deadwood and litter. Organic carbon in mineral and organic soils is not included. With regard to greenhouse gases (GHGs), the submission includes only emissions of CO_2.

10. The annexes to the modified submission (see para. 3 above) were not subject to the TA but they provided useful information that contributed to the clarification of some of the

[9] Decision 13/CP.19, annex, paragraphs 1(b), 13 and 14.

[10] http://unfccc.int/8414.

[11] While the assessment that was carried out in 2011–2015 was formally known as the National Forest and Biodiversity Assessment, herein both will be referred to as "national forest assessments". As explained by Honduras during the TA, the reason for the assessments having different cycle lengths was economic.

[12] In decision 1/CP.16, paragraph 70, the COP encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks.

[13] In its original submission Honduras proposed a national FREL of 7,756,056.50 t CO_2 eq/year for the historical reference period 2000–2016. The difference between the original and the modified submission is mostly due to the different treatment given to the emission factors and a different method used to derive activity data. Both changes were implemented as a result of the facilitative interactions with the AT.

technical issues encountered and increased the transparency of the submission. In the modified submission, annex 8 to the original submission was excluded and a new annex containing information on forest typology in Honduras was included.

II. Data, methodologies and procedures used in the construction of the proposed forest reference emission level

How each element in the annex to decision 12/CP.17 was taken into account in the construction of the forest reference emission level

1. Information that was used by the Party in the construction of the forest reference emission level

11. For the construction of the national FREL, Honduras used the methodology in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) as the basis for estimating changes in carbon stock from the conversion of forest land to non-forest land.[14] Accordingly, gross emissions from deforestation were estimated for the period 2000–2016 by combining activity data (i.e. annual deforested area) with the appropriate emission factors (i.e. carbon stocks associated with the corresponding forest stratum and carbon pool).

12. The activity data used in the construction of the FREL for Honduras's national territory were based on a map that shows forest cover changes due to deforestation for the periods 2000–2006, 2006–2012 and 2012–2016. The map, generated by processing[15] medium-resolution Landsat 7 and Landsat 8 images, provides information on forest cover changes by classifying the land under stable forest, stable non-forest or forest cover loss.[16] Any area classified under forest cover loss in a given period is considered deforested.

13. The basis for the forest cover changes map was a 2012 forest cover and land-use map generated using two cartographic inputs: (1) a RapidEye map (2012); and (2) a mosaic of Landsat images (2012). Information for 2000, 2006 and 2016 was generated by processing[17] medium-resolution Landsat 5, Landsat 7 and Landsat 8 images. In order to detect forest cover losses for the periods 2000–2006 and 2006–2012, as classified in the forest cover changes map, scripts were developed to compare non-forest areas in 2012 with existing forest areas in 2000 and 2006. Similarly, existing forest areas in 2012 were compared with non-forest areas in 2016 to obtain forest cover loss for the period 2012–2016. Finally, the areas deforested in each period were linearly interpolated to determine an annual deforested area for all the years 2000–2016.

14. Honduras noted that, in order to stratify the deforested areas identified into the strata considered in the construction of the FREL (i.e. wet broadleaved forest, deciduous broadleaved forest, coniferous forest and mangrove forest), an intersection with a forest typology map that shows climax vegetation was used for the periods 2000–2006 and 2006–2012. The information on forest strata included in the 2012 forest cover and land-use map was used to stratify deforested areas for the period 2012–2016.

15. With regard to emission factors, the modified submission (table 17) provides information on carbon stocks for the four forest strata disaggregated into the four carbon pools above-ground biomass, below-ground biomass, deadwood (which includes stumps,

[14] The *2006 IPCC Guidelines for National Greenhouse Gas Inventories* were also used for the default value for the carbon fraction of forest biomass (0.47) in forest strata other than coniferous forest.

[15] See annex 5 to the FREL submission for further information on the images used and the method implemented to generate the map.

[16] Stable forest refers to lands that were classified as forest in the initial period considered (2000) and remained so until 2016. Stable non-forest refers to lands that were classified as non-forest in the initial period considered (2000) and remained so until 2016. Forest cover loss is the difference between the forest area detected in the initial year of a period and that detected at the end of that period.

[17] Using the Google Earth Engine platform.

standing dead trees and deadwood lying on the forest floor) and litter. Information on biomass stock for each of those pools was derived by using equations[18] in combination with information collected during the national forest assessments.[19] Dasometric information at tree level (diameter at breast height and height) was used along with two allometric equations (one for coniferous and one for broadleaved species; for the latter information on density was also necessary[20]) to derive information on above-ground biomass. Below-ground biomass was derived as a function of above-ground biomass.[21] Carbon stock information for the pools was obtained by multiplying the resulting biomass by carbon fractions.[22] For stumps, volume was obtained using Smalian's formula,[23] and for deadwood lying on the forest floor, volume was a function of the length and diameter of each piece. In both cases, the volumes were converted into biomass and then into carbon by using densities and carbon fractions appropriate to the decomposition status of the wood.[24] The wet biomass from litter in a subsample area of 0.5 m by 0.5 m was collected and brought to the laboratory to estimate dry matter and carbon content. Finally, information on carbon stock by pool was multiplied by 44/12 to obtain information on CO_2 emissions by forest stratum and carbon pool.

16. In response to a technical input from the AT, Honduras explained that cacao and shade-grown coffee plantations[25] are considered forests according to the forest definition used in the construction of the FREL, but they are not considered as such in the national forest assessments. In the modified submission, information was included to clarify that these forest types are not treated as independent forest strata owing to the lack of spatially explicit information on cacao areas, the limited availability of information on areas of coffee plantations (available for 2014 only) and the fact that no specific emission factors are available for these agroforestry systems as dasometric information was not collected for them during the national forest assessments. Honduras noted that when these areas are subject to deforestation, the emission factors for wet broadleaved forest are assigned to them. The AT commends Honduras for including this information, which increased the transparency of the submission. The AT considers consistency in the treatment of agroforestry systems in relation to forest definition, activity data and emission factors to be an area for future technical improvement.[26]

[18] See table 9 and section 2.5.9 of the modified submission for information on the equations and methods used.

[19] Information on deadwood lying on the forest floor and on litter was collected only during the second national forest assessment.

[20] The densities used to estimate above-ground biomass in broadleaved species were taken from the Dryad database (http://datadryad.org/resource/doi:10.5061/dryad.234). If density was not available at the species level, an average value was taken from species of the genus or, if necessary, the family. If this information was not available for a given species, the average value of densities for tropical, for Mexican and for South American species was used (0.6277 g/cm^3).

[21] The equation used was developed for tropical forests. Honduras stated that it was working on methods to derive below-ground biomass for non-tropical forests with greater accuracy.

[22] The carbon fraction values used were 0.518 t carbon (C)/t dry matter for coniferous species (Alberto D and Elvir JA. 2005. Acumulación y fijación de carbono en biomasa aérea de *Pinus oocarpa* en bosques naturales de Cabañas, La Paz. *Tatascán.* 17(2): pp.3–12.) and 0.47 t C/t dry matter (*2006 IPCC Guidelines for National Greenhouse Gas Inventories*) for broadleaved and mangrove species (only for above-ground and below-ground biomass). In the case of mangroves, the carbon content of deadwood and litter was taken from the national inventory of Costa Rica (http://www.reddccadgiz.org/documentos/INF_CostaRica_ParaWeb.pdf); the value was very close to that from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

[23] Cited in Food and Agriculture Organization of the United Nations. 1980. *Estimación del volumen forestal y predicción del rendimiento.* Available at http://www.fao.org/docrep/016/ap353s/ap353s00.pdf.

[24] See tables 10 and 11 of the modified submission for information on the carbon fractions and wood densities.

[25] Honduras explained that shade-grown coffee plantations always have a canopy coverage of more than 30 per cent.

[26] Honduras informed the AT that the collection of dasometric information for this vegetation type is planned for the third national forest assessment.

17. In the original submission, dasometric information from the national forest assessments for mangrove forest was not taken into account owing to the high error associated with the corresponding emission factors, which arose because their values were derived from measurements taken at only two sample plots. Honduras clarified that from a dasometric perspective mangrove forest was treated as wet broadleaved forest. As a result of the interaction with the AT, in the modified submission the Party included mangrove forest as an independent stratum for which specific emission factors were derived. Specifically, information on above-ground and below-ground biomass was taken from a local study[27] that analysed the organic carbon in mangroves in the Jeanette Kawas National Park, while information from the national forest inventory of Costa Rica was used to derive emission factors for the other carbon pools. The AT noted that, despite the small share of areas of mangrove forest affected by deforestation, its treatment in the modified submission as an independent forest stratum increased the overall accuracy and transparency of the FREL. The AT considers greater consistency of emission factors for the carbon pools and the collection of dasometric information covering the variety of mangrove forests in Honduras to be areas for future technical improvement to be addressed as part of the stepwise approach.

18. In the original submission, emission factors used in the construction of the FREL were derived separately for the periods 2000–2006, 2006–2012 and 2012–2016: dasometric information from the first national forest assessment was used to derive emission factors for deforestation for 2000–2012, while dasometric information from the second national forest assessment was used to derive emission factors for deforestation for 2012–2016. During the technical exchange of information, the AT sought the reason for the significant increase in overall estimated emissions for the latter period of the time series (2012–2016). Honduras explained that, among other influences (see para. 24 below), the increase was due to an increase in the emission factor values used for the period 2012–2016, specifically those used for wet broadleaved forest. The increase in values was a result of the inclusion, in the second national forest assessment, of dasometric information from new sample plots in protected areas, which are often associated with higher biomass stocks.[28] For its modified submission Honduras averaged emission factors derived from dasometric information from the first and second national forest assessments, hence reducing the variability of the values in different periods and in turn the resulting estimated emissions across the historical reference period. The AT acknowledges the explanation provided and commends the Party for the implementation of this improvement. The AT welcomes the ongoing efforts of Honduras to launch the third national forest assessment, which will increase the sample area and the measurements available for the different carbon pools, thereby reducing the associated errors in the emission factors.

19. Dasometric information on tree vegetation, deadwood and litter was collected during the two national forest assessments (see para. 15 above). In the first and second assessments, measures were taken at 181 and 263 sample units, respectively, of which 131 and 229 units, respectively, were in areas considered as totally or partially forest. Each sample unit, of 500 m by 500 m, included four sample plots of 250 m by 20 m, with the exception of the sample units added in the second assessment, which included plots of 130 m by 20 m.[29] The total carbon stocks in the four forest strata ranged from 28.53 t C/ha to 241.64 t C/ha. The AT agreed with these values, which overall are consistent with the IPCC good practice guidance for LULUCF. During the TA, the AT sought information on the number of sample units measured for each of the forest strata. Honduras explained that, for the construction of the FREL, in the original submission neither the sample units nor the plots were classified by forest stratum owing to the size of the sample units and the large

[27] Rivera-Monroy V, Castañeda-Moya E, Carrasco J and Caviedes V. 2013. *Análisis de carbono orgánico total en manglares del Parque Nacional Jeannette Kawas*. p.29.

[28] According to information in the modified submission, 53 and 79 sample units were measured in protected areas in the first and second national forest assessments, respectively.

[29] During the second national forest assessment, of the 263 sample units, 156 had already been measured in the first assessment, while 107 were measured for the first time. In both assessments the sample plots had a nested structure in which each biomass compartment was measured in certain areas within the plots. See table 6 of the modified submission for further information on the size and design of the sample units.

variety of existing forests in the country. Therefore, each individual tree was classified by forest stratum and the dasometric information was extrapolated to the ha and then averaged with the available information for other trees classified under the same stratum to derive the emission factors for each biomass compartment and forest stratum. Following a recommendation by the AT, a different approach was implemented for the modified submission (see para. 23 below).

2. Transparency, completeness, consistency and accuracy of the information used in the construction of the forest reference emission level

Methodological information, including description of data sets, approaches and methods

20. Honduras's FREL was based on the historical average of annual emissions of CO_2 from gross deforestation in the period 2000–2016, with the activity data being derived from a map of forest cover losses in three assessment periods, generated by analysing remotely sensed data, and the emission factors being estimated mainly from dasometric information collected during the two national forest assessments (see paras. 12–19 above). During the TA, the AT sought clarification on a number of issues regarding how the FREL was constructed, including on the derivation of activity data and emission factors and their consistency. In several cases, Honduras referred the AT to information included in the annexes to the FREL submission. In the modified submission, in response to a request of the AT for greater transparency of the information communicated, the Party enhanced the clarity of the submission by including in the main text clearer descriptions of each of the steps for constructing the FREL. The AT commends Honduras for the inclusion of this information, which facilitated the assessment of the submission and significantly increased its transparency.

21. Decision 13/CP.19, annex, paragraph 2(a), indicates that the TA of the proposed FREL should assess the extent to which the FREL maintains consistency with corresponding anthropogenic forest-related GHG emissions by sources and removal by sinks reported in the national GHG inventory. The AT noted that the information on GHG emissions provided in the GHG inventory that was included in the second national communication that Honduras submitted to the UNFCCC in 2012[30] is not fully consistent with the information used in the construction of the FREL, in particular in terms of the carbon pools and gases included (see paras. 31–33 below). The Party explained during the TA that the GHG inventory was prepared by external consultants who did not leave reliable information on the methods and data used. As a consequence, when constructing the FREL, only CO_2 emissions from living biomass and dead organic matter were included, leading to inconsistency between the two documents. Honduras explained that efforts are under way to elaborate the third national communication, with a focus on ensuring the future methodological consistency between the FREL and the estimated emissions from the land use, land-use change and forestry sector included in the GHG inventory. The AT acknowledges that the lack of information on methods and data used for the GHG inventory along with the lack of the information needed for estimating more carbon pools and gases hampered the consistency of the documents. The AT commends Honduras for its endeavour to ensure consistency in the future between estimated forest-related GHG emissions reported in the national GHG inventory and the FREL.

22. In assessing the extent to which the information used in the construction of the FREL is consistent with the information submitted to other international organizations, the AT noted that the definition of forest that Honduras used for the *Global Forest Resources Assessment 2010* of the Food and Agriculture Organization of the United Nations[31] differs from the definition of forest used in the construction of the FREL. The Party explained during the TA that the definition used for the former was suggested by the Food and Agriculture Organization of the United Nations with the aim of ensuring a comparable analysis at the global scale. For the construction of the FREL, the forest definition used was

[30] The GHG inventory refers to 2000 and applied the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*.

[31] Available at http://www.fao.org/forest-resources-assessment/past-assessments/fra-2010/country-reports/en/.

based on the one established for the national Forest Law (2008), expert judgment on national capabilities and better information available, and followed the guidance for the construction of FRELs. Honduras explained that owing to a lack of information (see para. 21 above) the forest definition used in the latest GHG inventory is unknown, meaning that its consistency with the one used for constructing the FREL cannot be assessed. The AT acknowledges and appreciates the information provided by the Party.

23. The AT sought clarification on how the dasometric information collected during the national forest assessments was used to derive emission factors for each of the forest strata; specifically, on the number of sample units measured for each of the forest strata and whether or how each sample unit (or its sample plots) was assigned to a unique forest stratum in such a way as to ensure the consistency of the activity data and emission factors. Honduras explained that owing to the heterogeneity of the country's forests it was not possible to assign each sample unit to a unique forest stratum; rather, dasometric information at tree level was classified by forest stratum (see para. 19 above). The AT acknowledged and appreciated the information provided by the Party. However, the AT considered that, because of the heterogeneity of the forests, the lack of a direct link between forest strata, used to classify deforested areas, and dasometric information from the sample units, used to derive emission factors, led to inconsistencies between the activity data and the emission factors, which affected the accuracy of the original FREL submission. The AT therefore suggested that Honduras combine the available spatially explicit information on forest strata with the spatially explicit grid of sample units so that each sample unit (or, if possible, its plots) could be assigned to a unique forest stratum and therefore to the collected dasometric information used to derive emission factors for specific strata. In the course of the TA of the modified submission, the Party provided information confirming that the approach suggested by the AT had been implemented. The AT is of the view that this data processing method enhanced the accuracy of the carbon stock assigned to each deforested area and thus increased the overall accuracy of the FREL. The AT commends Honduras for its transparency and implementation of this improvement.

24. The AT noted that, in the original FREL submission, the estimate of annual emissions from deforestation for the assessment period 2012–2016 was significantly higher than those reported for the two previous periods (2000–2006 and 2006–2012). The AT noted that the increase was, among other influences (see para. 18 above), due to an increase in the values of the activity data used to estimate emissions for the period. In response to a question raised by the AT, Honduras explained that the increase also partly resulted from the fact that forest cover losses in each period, estimated from the analysis of remotely sensed data, were subsequently re-estimated on the basis of an assessment of their accuracy, which was carried out using the Olofsson et al. (2014)[32] methodology. During the technical exchange of information, the AT considered that the adjustment of the estimated deforested areas on the basis of that methodology resulted in an increase in estimated deforestation for the period 2012–2016 that was not well justified, and therefore it suggested that the Party use the originally estimated deforested areas, leaving the Olofsson et al. methodology to provide information only on the uncertainty of the forest cover change map. Honduras implemented this suggestion for the modified submission, hence reducing the variability in the estimated deforestation areas between different periods and the resulting estimated emissions across the historical reference period. The AT commends the Party for introducing the change and appreciates the resulting increase in the consistency and accuracy of the FREL.

25. In assessing the completeness of Honduras's FREL submission, the AT requested information on the underlying data used to derive emission factors, along with information on activity data, that would allow the reconstruction of the FREL. During the TA, Honduras provided the AT with more information on annual deforested areas and their uncertainties, but no information was provided on the underlying data used to derive emission factors. The AT considers that the lack of such information prevented a full assessment of the completeness of the submission. The AT also considers that making this

[32] Olofsson P, Foody GM, Herold M, Stehman SV, Woodcock CE and Wulder MA. 2014. Good practices for estimating area and assessing accuracy of land change. *Remote Sensing of Environment*. 148: pp.42–57.

information, along with the information contained in the annexes to the modified submission, publicly available[33] would increase the reproducibility and completeness of the submission and should be considered an area for future technical improvement. In an attempt to reconstruct the FREL and to rule out potential artefacts, the AT used the annual deforested areas and the emission factors by forest stratum provided in the modified submission to derive an estimate of total emissions from deforestation for the period 2000–2016, which resulted in negligible and acceptable differences compared with the values used in the FREL, which were assumed to arise from the use of different numbers of decimal places.

26. Honduras provided a complete and clear description of how the Olofsson et al. [34] methodology was used to assess the accuracy of the map showing forest cover changes due to deforestation. The accuracy assessment was carried out by an independent team of experts from the National Autonomous University of Honduras, who evaluated 2,678 polygons distributed in 20 categories throughout the periods 2000–2006, 2006–2012 and 2012–2016. The overall accuracy of the map was found to be 96.13 per cent. The AT commends Honduras for the development of the accuracy assessment and the provision of specific information on uncertainty, and for its ongoing efforts to increase the accuracy of the estimates in future FREL submissions. However, the AT noted that Honduras did not provide information on the uncertainty associated with the emission factors used in the construction of the FREL, and did not implement an error propagation analysis to estimate the overall uncertainty of the FREL. The AT considers that the inclusion of complete information on uncertainty in future FREL submissions would help to build confidence in the emission estimates and to identify areas in which to focus improvement efforts, and therefore that this can be seen as an area for future technical improvement to be considered in the context of the stepwise approach.

Description of relevant policies and plans, as appropriate

27. As the proposed FREL is based entirely on historical data, no assumptions about future changes to domestic policies are included in the submission. Information on the causes of deforestation and possible future trends is included in the submission as part of the description of national circumstances. Specifically, Honduras included an existing document that compiles information about the country's vision to 2038, an analysis of the causes of deforestation, and information on population growth, the economy, the agriculture sector, the forest sector and existing policies and regulations.

3. Pools, gases and activities included in the construction of the forest reference emission level

28. According to decision 12/CP.17, annex, subparagraph (c), the reasons for omitting a pool and/or activity from the construction of the FREL should be provided, noting that significant pools and/or activities should not be excluded.

29. The carbon pools included in the FREL are above-ground biomass, below-ground biomass, deadwood and litter. Soil organic carbon in mineral and organic soils is not included. With regard to GHGs, only CO_2 emissions were estimated and included in the FREL submission.

30. The AT could not find evidence in the modified submission that omitted carbon pools and gases are unequivocally insignificant. In response to a question raised by the AT during the TA, Honduras explained that a lack of the information necessary to estimate emissions for the soil organic carbon pool and gases other than CO_2 was the reason for their omission. The AT acknowledges this reason, but considers that, as discussed with the Party during the TA, the assessment of the significance of emissions from omitted carbon pools and of omitted gases in order to comply with decision 12/CP.17, annex, subparagraph (c), for future FREL submissions should be seen as an area for future technical improvement as part of the stepwise approach.

[33] Honduras informed the AT that the annexes to the modified submission will be made publicly available at http://ocphn.org/nivelesreferencia_redd.html.

[34] As footnote 32 above.

31. Regarding the soil organic carbon pool, the AT noted that CO_2 emissions from soil management and land-use change reported in the GHG inventory included as part of the second national communication represent about 57 per cent of the emissions from biomass from forests and pastures in conversions.[35] The AT considers that, even if not unequivocally, the relative comparison of emissions from soils with those from biomass might indicate some significance of the soil organic carbon pool, while at the same time acknowledging that the lack of the underlying information necessary to properly estimate such emissions suggests the need for caution when interpreting the results. Therefore, as discussed with the Party during the technical exchange, particularly with regard to mineral soils, the AT considers that the compilation of information on carbon stocks and their dynamics after a deforestation event should be an area for future technical improvement, which will then allow Honduras to comply with the requirements set out in decision 12/CP.17. The AT notes that after deforestation events the soil organic carbon in mineral soils often behaves the same as that in the living biomass carbon pools, so when the emissions from those pools are reduced following a decrease in deforestation, emissions from mineral soils would also be reduced.

32. No explicit information on emissions from organic soils was included in the submission of the proposed FREL. However, the AT consulted the literature[36] regarding soil classification in Honduras and found that histosols are not present in the country or their presence is at an insignificant level. Hence, the AT considers that emissions from organic soils following deforestation events are likely to be insignificant and that their exclusion from the FREL is justified.

33. The AT noted that the GHG inventory included as part of the second national communication provides information on emissions of non-CO_2 gases (methane (CH_4), nitrous oxide (N_2O), carbon monoxide and nitrogen oxides) resulting from forest fires for 2000. Specifically, N_2O emissions were reported as 0.40 Gg and CH_4 emissions as 58.56 Gg.[37] In addition, the AT noted that the information on forest fires included in the modified FREL submission reveals that, although these events may be a significant source of non-CO_2 gases in some years of the time series (e.g. 53.32 Gg emissions, 90 ha affected, in 2015), not all forest fires are associated with deforestation events. The AT commends Honduras for the information on the impact of forest fires included in the modified submission and considers that the exclusion of non-CO_2 gases is adequately justified in the light of the currently available information. However, in order to maintain consistency with the GHG inventory, the AT is of the view that for future FREL submissions the inclusion of non-CO_2 gases could be considered if forest fires are identified as leading unequivocally to deforestation.

34. Of the eligible activities identified in decision 1/CP.16, paragraph 70, Honduras has chosen "reducing emissions from deforestation" for the calculation of its FREL. In the modified submission, the Party included information on its ongoing efforts to include in future submissions the activity "reducing emissions from forest degradation", while during the TA it mentioned that efforts are also being made to collect information that would allow inclusion of the activity "enhancement of forest carbon stocks" in the future. Regarding the former activity, efforts are focused on the establishment of a definition of forest degradation and on the improvement of methodologies to assess the magnitude of emissions from degradation as a consequence of forest fires, pest infections and fuelwood consumption. The AT commends Honduras's expressed intention to assess the option of the future inclusion of this activity as well as for the information provided. The AT

[35] According to the second national communication, CO_2 emissions from living biomass from forests and pastures in conversions totalled 35,241.00 Gg in 2000, while CO_2 emissions from soil management and land-use change amounted to 20,101.12 Gg.

[36] Gardi C, Angelini M, Barcelo S, Comerma J, Cruz Gaistardo C, Encina Rojas A, Jones A, Krasilnikov P, Mendonca Santos Brefin ML, Montanarella L, Muniz Ugarte O, Schad P, Vara Rodriguez MI, Vargas R and Ravina da Silva M (eds.). 2015. *Soil Atlas of Latin America and the Caribbean.* European Commission – Publications Office of the European Union, L-2995 Luxembourg.

[37] This represents N_2O emissions of 119,200.00 t CO_2 eq and CH_4 emissions of 1,464,000.00 t CO_2 eq using global warming potential values of 298 (N_2O) and 25 (CH_4).

acknowledges that the activity currently included in the FREL (reducing emissions from deforestation) is likely the most significant of the five activities identified in decision 1/CP.16, paragraph 70, in accordance with national capabilities and circumstances. However, noting the information included in the modified submission on pest infections,[38] the AT considers that emissions from forest degradation in some years of the historical period may be relatively important when compared with emissions from deforestation and therefore the assessment of their significance should be seen as an area for future technical improvement of the FREL.

4. Definition of forest

35. Honduras provided in its submission the definition of forest used in the construction of its FREL[39] and confirmed during the TA that the definition was established in a participatory manner and bearing in mind the need for it be oriented towards the REDD-plus policy context and activities aimed at sustainable forest management within the country.

36. The AT noted that Honduras has several official definitions of forest, established for various purposes (e.g. national Forest Law, clean development mechanism). In response to a question raised by the AT, Honduras explained that the forest definition used in the construction of the FREL was not the same as the one used in the national forest assessments. Differences relate to the thresholds of minimum area and forest cover[40] and to the treatment of agroforestry systems. The Party explained that, owing to the technical constraints of photo-interpreting the medium-resolution satellite images used to derive forest cover changes, in practice, deforestation could be identified unequivocally only in areas with a minimum forest cover of 30 per cent, and 30 per cent was therefore the forest cover threshold used for constructing the FREL. Regarding the agroforestry systems cacao and shade-grown coffee plantations, Honduras explained that they were considered forests in the construction of the FREL but not in the national forest assessments (see para. 16 above). The AT welcomes these explanations and commends the Party for including them in the modified submission as they contributed to increasing the transparency of the submission. Nevertheless, the AT considers that maintaining the consistency of the definition of forest used to derive activity data and emission factors should be considered as an area for future technical improvement, and that the estimation of deforested areas should be made using a forest cover threshold in line with the forest definition used.

III. Conclusions

37. The information used by Honduras in constructing its FREL for the activity "reducing emissions from deforestation" is transparent but partially complete and therefore not fully in accordance with the guidelines for submissions of information on FRELs/FRLs (as contained in the annex to decision 12/CP.17).

38. The AT acknowledges that Honduras included in the FREL the most significant activity, and the most significant pools in terms of emissions from deforestation. In doing so, the AT considers that the Party followed decision 1/CP.16, paragraph 70, on activities

[38] Table 24 of the modified submission shows that, during the period 2014–2016, 508,750.30 ha coniferous forest was affected by *Dendroctonus frontalis*, which is 36 per cent more than the total deforested area estimated for the period 2000–2016.

[39] A forest is defined by Honduras as a natural or planted association of tress (in any stage of growth) that can or cannot has shrubs, which cover a minimum area of 1hectare, and that can produce wood, other forest products, goods, and ecosystem services to the benefit of the society; having an impact in the water regime, soil, climate, and that provide habitat for the wildlife. The forest cover of such associations has to be higher than 10%, with a minimum tree height of 2 meters in mangrove forests and 4 meters in the rest of the ecosystems. Moreover, forests are considered also temporarily un-stocked areas as a consequence of anthropogenic actions, or natural circumstances, but that presents potential conditions, features and vocation to become forest.

[40] The minimum area used to define forests in the national forest assessments was 0.5 ha and the forest cover threshold was 10 per cent. Agroforestry systems were not considered forests in the national forest assessments.

undertaken, and decision 12/CP.17, paragraph 10, on implementation according to a stepwise approach. The AT commends Honduras for the information provided on the ongoing work to improve the accuracy and consistency of and to compile data and information for the inclusion of new activities in future FREL submissions.

39. As a result of the facilitative interactions with the AT during the TA, Honduras submitted a modified submission that took into consideration most of the technical inputs of the AT. The AT notes that the transparency and accuracy of information improved significantly in the modified FREL submission, and commends Honduras for the significant efforts it made in this regard.

40. Honduras explained that the FREL submission is not consistent with the GHG inventory included in the second national communication in terms of the GHGs and carbon pools included (see para. 21 above).[41] The reason for this is that the GHG inventory was developed by external consultants who did not leave information on the underlying data and methods used. When constructing the FREL, the currently available information allowed only the inclusion of CO_2 emissions from living biomass and dead organic matter. The AT acknowledges this explanation and commends Honduras for the information provided on the ongoing efforts to ensure consistency between GHG inventories and FREL submissions in the future.

41. Pursuant to decision 13/CP.19, annex, paragraph 3, the AT identified the following areas for future technical improvement:

(a) The development of an improved national system for the collection of activity data and emission factors that allows the assessment of deforested areas in line with the adopted forest definition and ensures consistency, including:

(i) Collection of activity data in line with the forest cover threshold used to define forests (see para. 36 above);

(ii) Stratification of areas of agroforestry systems and collection of dasometric information to derive specific emission factors for those areas (see para. 16 above);

(iii) Improvement of the representativeness of the emission factors used to estimate emissions from deforestation affecting mangrove forests (see para. 17 above);

(iv) Increase of sample size, as planned by the collection of dasometric information from a larger number of sample units, and development of more specific allometric equations (see para. 18 above);

(b) The inclusion of information on uncertainties for emission factors (see para. 26 above);

(c) The provision of publicly available information on the underlying data used to construct the FREL so as to ensure the reproducibility of the FREL and allow an assessment of its completeness (see para. 25 above).

42. In assessing the pools and gases included in the FREL, pursuant to decision 13/CP.19, annex, paragraph 2(f), the AT notes that the current omission of pools and gases is likely to be conservative in the context of the FREL. Nevertheless, the AT identified the following additional areas for future technical improvement:

(a) The collection of information for the omitted carbon pools on carbon stocks and their dynamics following deforestation events in order that their significance may be assessed and the exclusion or inclusion of their estimation justified (see para. 31 above);

(b) The treatment of non-CO_2 emissions from forest fires and consistency with the GHG inventory (see para. 33 above).

43. The AT acknowledges and welcomes the intention expressed by Honduras:

(a) To make efforts to ensure consistency between future FREL submissions and GHG inventories;

[41] In reference to the scope of the TA, decision 13/CP.19, annex, paragraph 2(a).

(b) To improve the collection of activity data in order to improve the consistency of the forest definition, activity data and emission factors;

(c) To continue working on the development of more species-specific allometric equations;

(d) To continue working on the acquisition of data on forest degradation to allow inclusion of this activity in future FREL submissions.

44. In conclusion, the AT commends Honduras for showing a strong commitment to the continuous improvement of its FREL estimates in line with the stepwise approach. Areas for future technical improvement of Honduras's FREL have been identified in this report. The AT acknowledges that these improvements are subject to national capabilities and policies, and notes the importance of adequate and predictable support.[42] The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Honduras.

45. The table contained in the annex summarizes the main characteristics of Honduras's proposed FREL.

[42] Decision 13/CP.19, annex, paragraph 1(b), and decision 12/CP.17, paragraph 10.

Annex

Summary of main features of the proposed forest reference emission level based on information provided by the Party

Main features of the FREL		*Remarks*
Proposed FREL (in t CO_2 eq/year)	6 552 746.47	The FREL includes emissions from deforestation and excludes any subsequent emissions and removals (see para. 7 of this document)
Type and duration of FREL	FREL = average historical emissions 2000–2016	See paragraph 7 of this document
Adjustment for national circumstances	No	–
National/subnational[a]	National	–
Activities included[b]	Deforestation	Deforestation is defined as the conversion from forest land to non-forest land, including shade-grown coffee and cacao plantations (see para. 7 of this document)
Pools included[b]	AB, BB, DW, L	For the reported pools, it is assumed that carbon stock after a deforestation event is zero. The soil organic carbon pool was not included owing to a lack of information (see para. 29 of this document)
Gases included	CO_2	See paragraph 29 of this document
Forest definition[c]	Included	Forest is defined as a natural or planted association of trees (at any stage of the life cycle) that may or may not be accompanied by shrubs or other layers, and which covers a minimum area of 1 ha, can produce wood, other forest products, goods and ecosystem services to the benefit of society and has an impact on the water regime, soil and climate and provides habitat for wildlife. The forest cover of such an association has to be higher than 10%, with a minimum tree height of 2 m for mangroves and 4 m for other ecosystems. Also considered as forest are areas that have been temporarily unstocked owing to human intervention or natural causes but that have the conditions and features and are suitable for potentially becoming forest. The forest cover threshold used for the construction of the FREL was 30 per cent (see paras. 35 and 36 of this document)
Relationship with latest GHG inventory	No information on the underlying data and methods used for the GHG inventory included as part of the second national communication exists. The inventory differs from the FREL in terms of the pools and gases included	Soil organic carbon and non-CO_2 gases are included in the GHG inventory in the second national communication but were omitted from the FREL (see para. 21 of this document)

Main features of the FREL		*Remarks*
Description of relevant policies and plans[d]	Included	Information included for information purposes (see para. 27 of this document)
Description of assumptions on future changes in policies[d]	Not applicable	Information included for information purposes (see para. 27 of this document)
Descriptions of changes to previous FREL	Not applicable	–
Future improvements identified	Yes	Several areas for future technical improvement were identified (see paras. 41–43 of this document)

Abbreviations: AB = above-ground biomass, BB = below-ground biomass, DW = deadwood, FREL = forest reference emission level, GHG = greenhouse gas, L = litter.

[a] If subnational, comments should include information on the treatment of displacement of emissions.

[b] In the case of omitted pools or activities, comments should include the justification provided by the country.

[c] The forest definition should be summarized, and it should be stated if it differs from the definition used in the GHG inventory or in reporting to other international organizations.

[d] May be relevant to the description of national circumstances, which is required in the case of adjustment.